THE

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AND OF

THE INSTITUTIONS IN UNION.

111TH SESSION.] FRIDAY, NOVEMBER 10, 1865. [No. 677. VOL. XIII.

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Announcements by the Council.

NOTICE TO MEMBERS.

The One-Hundred-and-Twelfth Session of the Society will commence on Wednesday, the 15th inst., when the Opening Address will be delivered by WM. HAWES, Esq., F.G.S., Chairman of the Council.

The following are the dates of the Wednesday evening meetings, the chair being taken at Eight o'clock:—

1865. November	—	—	15	22	29
„ December	6	13	20	—	
1866. January	—	—	17	24	31
„ February	7	14	21	28	
„ March.....	7	14	21	—	
„ April	4	11	18	25	
„ May.....	2	9	16	23	30
„ June	—	—	—	27*	

For the Meetings previous to Christmas, the following arrangements have been made:—

NOVEMBER 15.—*Chairman's Opening Address.*

NOVEMBER 22.—"On Water Supply, especially in Rural Parishes and Districts." By J. BAILEY DENTON, Esq.

NOVEMBER 29.—"On the Proposed Purchase of Railways by the Government." By WILLIAM HAWES, Esq., F.G.S.

DECEMBER 6.—"On the Graphotype, a Process for producing from Drawings, Blocks for Surface Printing." By HENRY FITZ-COOK, Esq.

DECEMBER 13.—"On London Milk." By J. CHALMERS MORTON, Esq.

DECEMBER 20.—"On Parkesine, its Composition, Manufacture, and Uses. By OWEN ROWLAND, Esq.

The Cantor Lectures for the ensuing Session will consist of Three Courses, to be delivered by G. W. HASTINGS, Esq., LL.D., Barrister-at-law; FLEEMING JENKIN, Esq., F.R.S.; and Dr. F. CRACE CALVERT, F.R.S.

* The Annual General Meeting: the Chair will be taken at Four o'clock. No Visitors are admitted to this Meeting.

The following are the particulars of Mr. Hastings's course:—

LECTURE I.—MONDAY, NOVEMBER 27TH.—"The Effects of the Discovery of the Precious Metals on the Ancient Civilisation of the Mediterranean."

LECTURE II.—MONDAY, DECEMBER 4TH.—"The Effects of the Discovery of the Precious Metals on Modern Civilisation.

LECTURE III.—MONDAY, DECEMBER 11TH.—"On Copyright."

LECTURE IV.—MONDAY, DECEMBER 18TH.—"On Limited Liability."

The lectures will commence each evening at Eight o'clock.

These Lectures are open to Members, each of whom has the privilege of introducing ONE Friend to each Lecture.

Proceedings of the Society.

MUSICAL EDUCATION COMMITTEE.

The following are the prospectuses of the three chief Private Academies of Music in the Metropolis:—

THE NATIONAL COLLEGE OF MUSIC.

Temporary Office, 216, *Piccadilly* (*two doors from the Regent-circus*).

The College is founded with the design of enabling ladies and gentlemen to obtain a complete professional education on the system of the Continental *Conservatoires*, and to encourage the study of music more generally throughout the United Kingdom.

Although the scale of fees is very moderate, the Council have the power of assisting those showing remarkable talent, by granting a lower scale of payment, by the establishment of scholarships, and even by gratuitous instruction under peculiar circumstances.

Classes for amateurs will be organised in connection with the College, as the Council desire to place it in the power of everyone to receive the best instruction at a moderate expense.

Council.—Sir Reginald Barnewell, Bart.; Henry Brougham, Esq.; Lord Douglas; Viscount Dunlo; Lord Elphinstone; Paul Graham, Esq.; Viscount Hamilton,

M.P.; Sir Henry A. Hoare, Bart.; the Hon. Greville Howard; Lord Schomberg Kerr; Capt. Le Patourel; Rev. Sir F. A. Gore Ouseley, Bart. (Mus. Prof. Oxon); J. St. Aubyn, Esq., M.P.; Harry W. Scott. Esq.; A. Nowell Sherson, Esq.; Captain Gerard Smith (Scots Fusilier Guards); Capt. the Hon Walter Trefusis; Rev. W. Crole Wyndham; and N. F. Zaba, Esq.

Treasurers.—The Marquis Townshend and the Hon. Seymour Egerton.

Trustees.—The Marquis Townshend, Lord Kingsale, and Rear-Admiral King, C.B.

Professors.—(Principal, Mr. Henry Leslie).—Composition—Mr. Benedict and Mr. Arthur Sulivan. Harmony—Mr. E. J. Hopkins and Mr. Franklin Tayler. Pianoforte—Mr. Benedict, Mr. Lindsay Sloper, Mr. Franklin Tayler, and Mr. J. G. Callcott. Singing—Mrs. Sims Reeves, Signor Pinsuti, Mr. Frank Mori, Mr. James Bennett, and Mr. Henry Regaldi. Violin—Herr Ludwig Strauss. Viola—Mr. Webb. Violoncello—Herr Daubert. Contra Basso—Mr. Howell. Flute—Mr. Sidney Pratten. Oboe—Mr. Alfred Nicholson. Clarionet—Mr. Lazarus. Bassoon—Mr. Waetzig. Horn—Mr. C. Harper. Trumpet and Cornet-à-Piston—Mr. Thomas Harper. Trombone—Mr. Winterbottom. Organ and Harmonium—Chevalier Lemmens. Concertina—Mr. J. C. Ward. Harp—Mr. Aptommas. Italian Language—Signor J. Pepoli. Declamation—Rev. W. W. Cazalet, M.A.

The students will be divided into two departments—ladies and gentlemen—and each department will be divided into two schools, "Upper and Lower." Fee for the "Upper" school, per term, £7; fee for the "Lower" school, per term, £5 5s.

Two scholarships (to be called the "Townshend" Scholarships) will be open to competition by all students of three terms; one of such scholarships to be given to the most deserving pupil in each school, who will thereby be entitled to a year's gratuitous instruction.

The half-yearly term will commence on Monday, February 20th; and Easter term on Monday, April 24th, 1865. Entrance fee, 5s.

Lessons During Each Term.

For the Upper School :—

Pianofort—Eighteen lessons of half-an-hour, with class lessons in harmony.

Singing—Eighteen lessons of half-an-hour, with instruction on the pianoforte, in harmony, the Italian language, and English declamation.

Composition—Eighteen lessons of half-an-hour, and instruction on the pianoforte and stringed or wind instruments.

Stringed Iustruments and Wind Instruments—Eighteen lessons of half-an-hour, and instruction on the pianoforte and harmony.

There will also be Orchestral Practice and Class Singing.

For the Lower School :—

The same amount of instruction will be given as for the Upper School, with the exception of the pianoforte, for which 24 lessons will be given in each term.

Regulations for Professional Students.

All students will be obliged to learn Harmony, and must attend whatever extra classes the Professors may deem essential to their improvement, but no further charge will be made on that account.

Performances will be given, at which the students may be required to assist.

Students will not be allowed to perform in public without the consent of the Council.

No lady or gentleman will be allowed to advertise as having been educated in the College, without the certificated sanction of the Professors.

The year will be divided into three terms, viz. :—Lent Term, commencing early in January and ending at the end of March. Easter Term, commencing in April and ending early in July. Michaelmas Term, commencing in October and ending before Christmas.

The Amateur Classes.

Classes for Amateurs will be held by Messrs. Benedict, Lindsay Sloper, and Ernst Pauer, for the Pianoforte; Monsieur Lemmens, for the Harmonium; Mrs. Sims Reeves, Mrs. G. A. Macfarren, Mr. Frank Mori, Signor Pinsuti, Signor Ciabatta, and Signor Mecatti, for Singing. Fee, for twelve lessons of half-an-hour each, £5 5s.

Mr. G. A. Macfarren's Class for Harmony and Composition.

Fee for twelve class lessons of one hour each, £3 3s.

Classes for Amateurs will be also formed under the other Professors of the College.

The pupils of these classes will not be allowed to compete for the scholarships, which are intended exclusively for the professional pupils. By Order of the Council,

GEORGE LESLIE, *Secretary.*

261, Piccadilly.

THE LONDON ACADEMY OF MUSIC.

St. James's Hall, Piccadilly, W.

Principal, Professor Wylde, Mus. Doc.

Masters.—Harmony and Composition—Herr Molique. Pianoforte—Dr. Wylde and Mr. J. F. Barnett. Italian Singing—Signor Garcia, Signor Lablache, and Signor Schira. Singing—Signor Zamboni and Signor Gilardoni. Sight-Reading and Accompaniment—Herr Wilhelm Ganz. Harp—Herr Oberthur and Mr. T. H. Wright. Violin—Her Molique and Herr Jansa. Violoncello—M. Paque. Organ—Mr. George Cooper. Harmouy—Herr Engel. Concertina—Signor Giulio Regondi. Italian Language—Signor Maggioni.

Other Masters in various branches. A lady superintendent and governess.

This Academy (which is divided into two departments, one for ladies the other for gentlemen) is designed for vocal and instrumental students desirous of receiving a complete musical education in this country, from the best London professors, on the moderate fees of the Continental Institutions.

Students can select either Harmony, Pianoforte-playing, Singing, or any other branch of the Art, as their principal study, and receive individual instruction in that branch from one of the principal professors; they will, in addition, receive instruction in two other branches.

For example:—A student selecting Harmony and Composition as a pricipal study, is entitled to receive individual instruction from Herr Molique, and Pianoforte and elementary Singing lessons.

A student selecting Pianoforte-playing as a principal study, is entitled to receive individual instruction from Dr. Wylde and Mr. J. F. Barnett, elementary Singing lessons, and Harmony lessons in the Principal's Harmony Class.

A student selecting Italian Singing as a principal study, is entitled to receive individual instruction either from Signor Garcia, Signor Lablache, or Signor Schira, Pianoforte lessons from an assistant professor, and class Harmony lessons.

Terms.

The year is divided into three terms, each term consisting of twelve weeks' instruction. A lesson is given once a week in each branch of study. The terms commence on January 12th, April 24th, and October 2nd. The Academy is closed for a mouth's vacation at Christmas, and for two months at the end of the London season.

Students residing at a distance can receive all their lessons on one day.

The fee for each student is five guineas per term, which includes the whole course of instruction necessary for a complete musical education. Italian and Elocution are extras. The fee for Italian is, fifteen shillings per

term of twelve weeks; for Elocution, fifteen shillings per term of ten weeks.

All fees are required to be paid in advance.

CANDIDATES FOR ADMISSION AS STUDENTS.

Candidates for admission as students must show that they possess sufficient ability to profit by the course of study, and are required to attend at the Academy before the commencement of the term at which they desire to be admitted, in order to be examined by the principal. The examination days can be known by referring to the advertisements in the *Times*. The examination-fee is five shillings, payable at the office, St. James's Hall, where prospectuses may be obtained.

A. AUSTIN, *Secretary.*

The competition for the scholarships took place in May last, Madame Schuman and Signor Arditi were umpires. Of the pianistes, Miss Fanny Baker and Miss Kate Roberts obtained an equal number of marks; of the vocalists, Miss Pratt obtained the highest number.

THE LONDON VOCAL ACADEMY.

18, *Cecil-street, Strand.*

Principal, Mr. Frederick Kingsbury.

Professors.—Cultivation of the Voice and Singing—By the Principal. Pianoforte and Accompaniment—Walter Bache, Esq. French Language—Mons. De Fontanier (author of "La Grammaire Simplifiée). Elocution—C. J. Plumpre, Esq. (Lecturer on Elocution, Oxford and London.

The Academy (divided into two departments, one for ladies and the other for gentlemen) has for its object complete education in all its branches of study necessary to the vocal artist, and is in this respect modelled upon the systems adopted by the Continental *Conservatoires.*

Instruction in the cultivation of the voice, and the formation of a finished style of singing, will be undertaken by the principal, from whom each student will receive separate personal tuition. The collateral studies, such as Pianoforte, Accompaniment, Harmony, Languages and Elocution (each so essential to the attainment of perfect vocalisation) will be undertaken by professors of the highest reputation; and as every branch of musical education other than those that have a direct bearing upon the art of singing is excluded, the attention of the student will not be diverted from the original object, viz., learning to sing.

The year is divided into three terms, of three months each. The first commencing in January, the second in April, and the third in October.

Each student will receive one lesson per week, of both separate instruction and class singing—the classes being limited to three students.

The fee for each student is three guineas for the term, payable in advance.

Examination and entrance-fee 5s.

The other branches of instruction are taught in classes, and are extra, as follows:—

Pianoforte and Harmony, two guineas; French and Italian Languages, fifteen shillings; and Elocution, fifteen shillings (per term).

Students desirous of taking private lessons from any of the professors, are requested to apply to the principal.

CANTOR LECTURES.

"ON SOME OF THE MOST IMPORTANT CHEMICAL DISCOVERIES MADE WITHIN THE LAST TWO YEARS." BY DR. F. CRACE CALVERT, F.R.S., F.C.S.

LECTURE VI.

DELIVERED ON TUESDAY, THE 16TH OF MAY, 1865.

Recent Researches on Metals and Alloys.

The importance of the subject which I intend to bring before you this evening is so extensive, that it ought to be the subject of a series of lectures instead of attempting to condense it into one, and, therefore, I shall only give a *resumé* of some of the discoveries which have been made during the last two years.

You are probably all aware that England occupies the first position among nations as a source of mineral wealth, and to enable you to appreciate the truth of this assertion, allow me to cite a few figures, published by Mr. Robert Hunt, F.R.S., the keeper of mining records at the Royal School of Mines. In 1863 the value of minerals produced was £29,151,976, from which metal of the value of £36,364,327 was extracted. There were produced—

Tin ore	15,170	tons
Copper ore	212,947	,,
Lead ore	91,283	,,
Silver ore	88	,,
Zinc ore	12,941	,,
Iron ore	3,500,000	,,

Further, it is interesting to compare the results given by Mr. Hunt in 1858 with the above, for we find that the mineral wealth of England has nearly doubled in five years, for in 1858 the value of the metals produced amounted only to £18,105,708. I must not omit to state that, during the last few years, England has also taken the lead in the manufacture of aluminium (Jno. Bell and Co., manufacturers, Newcastle) and magnesium, by Messrs. Mellon and Co., Salford, who have adopted the method proposed by Mr. Sonstadt. As to the four new metals which have been of late discovered, viz., cœsium, rubidium, thallium, and indium, they are as yet but scientific curiosities, but as their discovery is due to spectrum analysis, I shall refer to them more especially when treating of the method by means of which the discovery of these metals has been made, an illustration of which I shall be able to give, through the kindness of Mr. Ladd, who will show you the various spectra on the screen at the conclusion of the lecture.

Since I had the pleasure of drawing your attention last year to the then novel application of magnesium to the art of photography, owing to the intense light which that metal produces (for it has been calculated to be equal to $\frac{1}{3}\frac{1}{5}$th part of that of solar light, and has been seen at a distance of 28 miles at sea, and also to its intense actinic power), Mr. Bultinck has proposed the substitution of this metal for zinc in galvanic batteries, and states that he believes the substitution would prove a very advantageous one to electricians. The employment of this metal will be greatly facilitated by the large works which have been erected for its manufacture at Boston, in America.

Although Mr. Faraday observed many years ago that light was transmitted through thin leaves or sheets of the following metals:—platinum, palladium, rhodium, gold, silver, copper, tin, lead, iron, and aluminium, still we were not prepared for the interesting results that Mr. Quincke has obtained and published in the *Philosophical Magazine* for March, 1864. That gentleman endeavoured to determine directly the velocity with which light travels through metals, and he found, strange to say, that it travels faster through gold and silver than through a vacuum. Further, he adds that he was unable to detect any difference in the components of the light which had previously passed through transparent substances, such as plates of glass. The comparative rapidity of light in passing through metals and a vacuum appears to me to be in favour of the new theory of light, which I took the liberty of expounding to you in my first lecture. Although we could conceive the passage of light through a thin film of metal, still chemists were astonished when Mr. Henry St. Claire Deville, whose name I have had the pleasure of often citing in these lectures, published, conjointly with Mr. Troost, some interesting papers on the porosity of substances under the influence of high temperatures. His experiments enabled him to show that even platinum and wrought iron tubes, the latter one-eighth of an inch thick, are, when carried to a high temperature, permeable to gases. The importance of these results cannot be overrated by

chemists, when the permeability of platinum is considered, as that metal has been employed by them under the conviction that its high density and mode of manufacture destroyed all porosity. As to iron, the knowledge of that fact is most important, especially in the manufacture of coal-gas, where iron retorts are used for distilling the coal. So complete is the permeability of iron at a high temperature, that an iron tube which had been filled with hydrogen gas before the experiment was found to contain only a trace of it at the end of a few hours.

Considering the short space of time which I have at my command, I can only state that you will find in the Royal Society's Transactions (vol. 152, part 1, page 1) a most elaborate paper on "The Influence of Temperature on the Electrical Conducting Power of Metals," and also (vol. 150, part 1, page 85) one on the "Conductibility of Copper." These researches of Dr. Mathiessen deserve the the close attention of all electric telegraph engineers.

The study of metals must convince every student that, although science has progressed in a marked manner during the last 50 years, still that there is a great deal more to do than has been done. Although we have known copper, zinc, lead, tin, and iron for many centuries, still hardly a month passes without new properties of these metals being discovered, or facts connected with the improvement of their manufacture or the removal of the impurities they contain. I therefore, deem it my duty to advert to a few papers that have been published recently respecting certain impurities which particular metals contain, which impurities, in some instances, enhance the value of the metal, and in others lower their commercial value. No class of substances teaches the young chemist the difficulties and the labours he must be prepared for, if he wishes to be what is technically termed a good operator, and if he pretends to prepare a *pure* substance. I would, therefore, advise all young men studying chemistry, carefully to read the labours of J. S. Stas on "The Determination of the Equivalents of Chlorine, Sulphur, Nitrogen, Silver, Potassium, Sodium, and Lead," published in the *Moniteur Scientifique* of 1861 and 1864, where they will notice that Stas has spent months of time to obtain a few ounces of *pure* silver, lead, &c.

COPPER.—The same may be said of the researches of Mathiessen to obtain pure copper, for his studies above alluded to have enabled him to state that there is ne alloy of copper which conducts electricity better than pure copper (page 92 of the above memoir), for he found that the most minute quantities of arsenic, phosphorus, sulphur, selenium, tellurium, and oxygen diminished the conducting power of that metal. Whilst on the impurities of copper, I must not fail to mention some valuable additions which Messrs. Abel and Field have published in the *Journal* of the Chemical Society of London, on the means of determining various impurities which copper contains; thus they found sometimes traces, and sometimes several per cent. of the following impurities in many samples of commercial copper, silver, arsenic, antimony, bismuth, lead, tin, and iron (see Tables, vol. 14, page 302), and Mr. Abel, in a paper inserted in the same journal in 1864, proved that copper contained sulphur, as a general constituent, but only in minute quantities; selenium, as an occasional constituent; and that oxygen was always present and sometimes in considerable proportion; thus, in dry copper he found the quantity of oxide of copper, not as Messrs. Dick and Percy have stated, from 10·21 to 9·34 per cent., but from 3·77 to 4·56 per cent. Mr. Abel gives the following numbers as representing the average proportion of oxygen obtained with a series of samples taken in diverse stages in the manufacture of copper:—

	Oxygen per cent.
"Dry" copper	0·42
Ditto (another specimen)	0·50
"Half-poled" copper	0·20
"Tough-pitch" „	0·03
"Over-poled" „	0·03

IRON.—As far as our present day's knowledge extends, no metal is more influenced than iron, either for good or for bad, by the presence in it of a minute quantity of another element; thus a few thousandths of carbon transform it into steel, and a few per cent. of the same element converts it into cast-iron; a few thousands of sulphur, or a few per cent. of silicium, renders iron "red-short," that is to say, brittle at a red heat, whilst the same quantity (thousandths) of phosphorus makes it "cold-short," or brittle at natural temperature. These facts explain why iron smelters and manufacturers do all in their power to use ores as free as possible from these impurities, or apply all their skill to remove them from the ores or metal when present. I am therefore satisfied that all iron smelters will appreciate the value of the following facts, published by M. Caron in the *Comptes Rendus* of the Academy of Science of 1863, on the influence of manganese when used on the blast furnace to remove silicium from cast iron. The following table shows the relative quantity of manganese and silicium existing in the cast-iron thus produced:—

	Manganese.	Silicium.	
No. 1	7·93	0·05	
„ 2	6·32	0·08	
„ 3	4·70	0·30	
„ 4	3·81	0·55	
„ 5	2·25	0·76	
„ 6	3·90	0·50	cold blast.
„ 7	2·10	0·75	hot blast.

This table shows that as the quantity of manganese decreases in the pig iron the quantity of silicium increases; further, that the higher the temperature (all the rest of the operation being conducted in the same manner), the quantity of silicium increases and the manganese decreases.

M. Caron has further made the important remark, that it is the interest of the iron-smelter to use as much lime in the blast furnace as practicable when manganiferous ores are employed, for not only does lime facilitate the introduction of manganese into the iron, but also helps in a marked degree to remove the excess of silicium.

Eight or nine years ago I made the observation that if manganese had not the property of removing phosphorus from iron, it had the one of hiding or of counteracting the bad influence of that element on iron; in fact, I found that cast-iron, containing as much as one or two per cent. of phosphorus, would yield good mercantile iron if the pig iron contained at the same time five or six per cent. of manganese, and I have lately heard that manganiferous ores have been used with great advantage by the Cleveland iron smelters to overcome the "cold shortness" of their cast iron, which is due, as is well known, to the presence of phosphorus compounds in the Cleveland iron ore.

It is highly probable that the advantages which have been derived from the employment of "spiegeleisen" iron, in improving the quality of steel produced by Bessemer's process, is owing, not only to the fact that this peculiar iron contains a large quantity of carbon, which it yields to the molten iron contained in the large crucible used in Bessemer's process, but that the manganese it contains, contributes also to hide the influence of the phosphorous or to overcome the detrimental properties which a trace of phosphorous would impart to the steel produced by this process. I say hide, because the phosphorus is still present, since that substance cannot be removed by the above process from any pig iron in which it may be present.

M. Caron has published in the *Technologiste* for 1864, a paper in which he shows that no amount of lime on the blast will remove phosphorus from any ore which may contain it; and that tin-plate manufacturers and others who employ charcoal iron, should pay the greatest attention to the quantity of phosphorus contained in the charcoal they employ for refining ordinary iron; thus some charcoals are susceptible of yielding as much as 1 per cent. of phospho-

rus to iron, whilst others only 0·12 per cent., and lastly some only a trace.

If phosphorus, sulphur, and silicium are injurious to the quality of iron, the metal called tungsten, on the contrary, appears to improve in a marked degree its quality, especially when in the state of steel. This fact has not only been demonstrated beyond all doubt by Mr. Mushet, but also recently by some scientific researches due to M. Caron, who has proved that steel containing tungsten, presents greater tenacity, and can be used with great advantage for many purposes; in fact, he thinks that tungsten can be used instead of carbon as a converter of iron into steel. There can be no doubt that the employment of tungsten in connection with the hardening of steel, and other various applications which that metal is susceptible of, will be greatly enhanced if the fact stated in the *Chemical News* of August 25th is brought to bear, viz., that a Swedish chemist has found a simple and practical method of extracting tungsten from its ore so as to reduce its cost of production to a few shillings per pound.

Mr. R. Johnson and myself have published a paper in the Memoirs of the Royal Society, in which we showed that the conductibility of iron was greatly modified by the quantity of carbon it contained, as proved by the following table:—

	Found.	Conductibility of silver = 1,000.
Wrought iron	13·92	... 436
Steel	12·65	... 397
Cast iron	11·45	... 359

We also found that the hardening of steel had the greatest influence on its expansibility, for whilst a steel bar, hardened to the maximum, expanded to a degree which may be represented by 84, the same steel rendered as soft as possible, expanded only 62.

Although the oxidation of iron, or its rapid destruction under the influence of the carbonic acid and oxygen of the air, is a source of great advantage to those who manufacture this article, still in many instances it is a source of annoyance to those who possess articles made of that valuable metal, and in others it is a national loss, as in the rapid decay which our iron ships of war undergo. Allow me, therefore, to say a few words on these points.

It is easy to preserve small articles made of iron from rust, either by plunging them into a weak solution of caustic alkali (whether the iron is preserved by a peculiar action of the alkali, or because it prevents the action of the carbonic acid of the atmosphere in conjunction with oxygen and moisture, are points to be determined), or covering them with a varnish made of india-rubber, gutta percha, and a small amount of fatty matter. As to the preservation of ships' bottoms from corrosion, without entering here into the various methods that have been proposed of late to effect this important object, still I deem it my duty to call your attention to one or two methods that have been tried with apparent success; thus Mr. Leach has applied on the iron surface of ships' bottoms a coating of gutta percha or other cement, and fastening by it sheets of glass of about one-fourth of an inch in thickness. The glass is previously bent to the shape of the ship, and pierced for the reception of the screw or bolts, which are preserved from immediate contact with the metal bolts by coating them with a little of the fastening mixture.

M. Becquerel relates, in the *Comptes Rendus* of the Academy of Sciences, 1864, the results which obtained by the application of his galvano-electric process on the iron keels of some of the French men-of-war. This process is based on the same principles as those adopted by Sir Humphrey Davy, in 1824, for preventing copper sheathing from being rapidly corroded by sea water, and which consisted, as you are aware, in attaching at various distances blades of zinc between the wooden side of the vessel and the copper sheets, or, what effected the same purpose, in using brass nails for fastening the copper to the sides of the vessel.

M. Becquerel employs zinc in connection with iron, thus establishing a galvanic current which renders the iron like the copper in Sir H. Davy's experiment electro-negative, or possessing the same kind of electricity as oxygen, therefore communicating to it the property of liberating oxygen from any compound instead of absorbing or fixing it. M. Becquerel has proved that the galvanic action of the zinc on the iron exercises its influence on the whole of the iron surface of the ship, but nevertheless that its influence decreases as the square of the distance, and consequently that its action is only sufficiently powerful to preserve iron from corrosion for a limited distance, and consequently the preserving bands of zinc must be placed at short intervals from each other.

Mr. Johnson and myself published, as I hope you will remember, in the *Journal* of the Society two or three years since, two papers bearing upon this same subject, the first paper containing facts exactly identical with those published in 1864 by Becquerel; the second showing the advantage that would be derived by shipbuilders in using galvanized iron plates instead of wrought iron ones for plating our men-of-war, for you are aware that the attack of sea water on iron plates in contact with oak was very great; being 2·880 as compared with galvanized iron, which was only of 0·095, all the circumstances of action being equal in both cases.

But the most important result that Mr. Johnson and I have arrived at on this point, is the demonstration in a paper we have published on "The action of sea-water on certain metals and alloys," that the action of sea-water on lead is nearly *nil*, as seen by the following table:—

ACTION OF SEA-WATER UPON METALS.

1 Metre.	Grammes.
Steel	29·16
Iron.....	27·37
Copper (best selected)	12·96
Do. (rough cake).....	13·85
Zinc	5·66
Galvanised iron (Johnson's process)	1·12
Block tin	1·45
Stream tin	1·45
Lead (virgin).....	trace
Lead (common).....	trace

This metal can, therefore, be used with great advantage to preserve the keels of iron ships from being corroded by the action of sea-water, and that the objection which might be raised as to its softness might be easily overcome by adding to lead a few hundredths of either arsenic or antimony, which would increase its hardness, and thus render it better fitted for the purpose referred to. From experiments that we have made we can further state that, in our opinion, Muntz's metal is a far superior article to copper for sheathing ships.—(See *Society of Arts' Journal*, April 21, 1865.)

As a few ladies have done me the honour to attend these lectures, it may be interesting to them to have a simple method of cleaning silver, or silver-plate, without the trouble of employing rouge or other cleaning powder, which, besides rapidly wearing off the metal, takes up much of their servants' time. It consists in plunging for half an hour the silver article into a solution made of 1 gallon of water, 1 lb. hyposulphite of soda, 8 oz. muriate of ammonia, 4 oz. liquid ammonia, and 4 oz. cyanide of potassium; but, as the latter substance is poisonous, it can be dispensed with if necessary; the plate being taken out of the solution, is washed, and rubbed with a wash leather.

Improvements have also been made of late in coating cheap metals, such as iron and brass, with more valuable ones, so as to enhance the value of the fancy articles made with them. If you remember, I referred to a process devised by Mr. Oudry for coating cast-*iron with copper* or bronze. The method that I wish now to bring before your notice is one devised by Mr. Weil, and is based on the same principle as the one which has been in practice

for some time in tinning iron pins, or covering brass with gold, viz., plunging the article to be coated into a boiling alkaline solution of a salt of tin, or a salt of gold; and, in the case of Mr. Weil, into one of copper, which consists of an organic salt of copper (say the double tartrate of copper and potash) with an excess of alkali, taking care that the cast or wrought iron to be coated is in contact with a brass wire during the operation.

I shall now take the liberty of dwelling for a short time on various memoirs which have been published in connection with the physical properties and chemical composition of alloys.

You will find in the "Transactions of the Royal Society," vol. 150, some extensive researches by Dr. Mathiessen on "The electrical conducting power of alloys;" also in vol. 154, on the influence which heat exercises on that important physical property of alloys. Mr. Johnson and myself have published papers on the density of alloys, as well as on the hardness, expansion, and conductibility of the same. It was admitted some years ago that alloys were simply a mechanical mixture of various metals, but the systematic researches which we have published leave no doubt, that when certain metals, such as tin and copper, bismuth and lead, zinc and copper, are employed in equivalent quantities, and that the proportion of each metal does not exceed two or three equivalents of one, to one equivalent of the other, that they are susceptible of combining and forming definite compounds. I may state, in corroboration of this statement, that if one equivalent of zinc and one equivalent of copper are melted together, or 49·32 of copper and 50·68 of zinc, and well stirred, and allowed to cool until a crust is formed on the surface, and then a hole be made in the crust and the fluid portion poured out, well defined prismatic crystals, sometimes of ½-inch long, will be found to coat the interior of the solidified mass, whilst if 45 per cent. of copper and 55 per cent. of zinc, that is to say, proportions which are no longer equivalent to each other, then, instead of obtaining a fine golden coloured crystalline alloy, a white amorphous mass will be produced, in fact, no brass founder attempts to use more than 40 per cent. of copper to produce brass, for experience has taught him that if he exceeds that quantity he obtains such a white metal that it is no more a marketable article. Another example is furnished by certain alloys for bronze. Thus, when two equivalents of tin for one equivalent of copper are employed, the conductibility of this alloy for heat is equal to that of both the metals together entering into its composition, whilst if the conductibility of alloys, composed of three equivalents of copper to one equivalent of tin, or four equivalents of copper to one equivalent of tin, is ascertained, it will be found that their conductibility is quite different and independent of that of the metals entering into their composition, in fact the conductibility of four equivalents of copper and one equivalent of tin is five times less than the one first cited.

Without occupying your time with further instances, let me call your attention to an important fact, that Dr. Matthiessen, Mr. Johnson, and myself have observed, viz., that the addition of a small quantity of a metal which may be considered as an impurity, completely modifies, in many instances, its properties, and the most important example that I am acquainted with, is the influence which the addition of one or two per cent. iron exercises on the properties of brass. If a brass be composed of 60 per cent. copper and 40 per cent. zinc, it will be susceptible of being drawn or bent when cold, but cannot be forged or worked when heated, whilst if 1·75 or 2·0 per cent. of iron be substituted for the same quantity of zinc, then a most valuable brass is obtained, for not only is this brass capable of being forged at a red heat like iron, but its tenacity is increased in an enormous proportion, for each square inch of surface is able to support a "breaking weight" of from 27 to 28 tons, a tenacity nearly equal to that of iron.

Messrs. Beyer and Peacock, of Manchester, who experimented with bolts made of this alloy, in the hope of substituting them for iron ones in the fire-boxes of locomotives, found that these bolts would support a strain equal to those of iron, and that the threads of the screw were not stripped with more facility than those of iron when exposed to the same strain.

There is no doubt than when this alloy becomes more generally known many valuable applications of it will be made in the arts and manufactures.

Whilst dwelling on valuable brass alloys let me state that two alloys have lately been introduced which will prove useful to those requiring them, namely, a white alloy, which is chiefly employed for the bearings of the driving wheels of locomotives, owing to its extreme hardness, and which is composed of:—

Zinc	77
Tin	17
Copper	6
	100

The other alloy has been lately proposed to calico printers by Mr. Lenssen as a substitute for the steel blades used by them to remove the excess of colour which adheres to the surface of their printing-rollers, and which blades bear the name of "doctors."

Mr. Lenssen's metal is composed of:—

Tin	4·93
Zinc	9·78
Copper	85·29
	100·00

This alloy is stated to have all the flexibility, tenacity, and hardness required for the "doctors" used in calico-printing, and, further, it presents the great advantage of not being acted upon by acid liquors, which action is often a great source of annoyance to calico-printers.

I shall conclude this lecture by alluding to the extraordinary modification in the fusibility of metals when several are fused together; thus, for example, the following well known alloys which liquify in boiling water:—

	Newton's alloy fusible at 212°.	D'Arcet's alloy fusible at 201°
Bismuth	5	8
Tin	3	3
Lead	2	5

Whilst the fusing point of these metals, when taken separately, is as follows:—

Bismuth	513°
Tin	451°
Lead	620°

Therefore the fusing point of each metal is several hundred times higher than when they are mixed in the above proportions.

A still more fusible alloy has lately been brought before the notice of the public by a Mr. Wood, in one of the American journals, in which he states that by melting together

Lead	8 parts.
Bismuth	5 „
Tin	4 „
Cadmuim	3 „

An alloy is obtained whose point of fusion is equal to 140 degrees, therefore susceptible of being used with great advantage for dental purposes.

I have now to refer to the four metals which have recently been discovered, viz. coesium, from *coesius*, "sky-coloured," owing to two blue lines which it produces in the spectrum: rubidium, from *rubidus*, "dark-red," owing the existence in its spectrum of two red lines of remarkable low refrangibility; thallium, discovered by Mr. William Crookes, and

which derives its name from *thallos*, "a budding twig," symbolising the beautiful green tint of budding vegetation; indium, discovered by Messrs. Reich and Richter, of Freiberg; all of which are due to the introduction into science of a mode of investigation, known as the "spectrum analysis."

The principle upon which this mode of research is based has been of late so well described and illustrated by Dr. William Allen Miller, in a paper read before the Pharmaceutical Society (see Society's *Journal*, February, 1862), and by Professor Roscoe in four lectures at the Royal Institution, London (see *Chemical News*, vols. 5 and 9), and which lectures have received such a wide publication that I think it useless here to enter into details, and more especially as Mr. Ladd will illustrate, by means of his powerful electric lamp, the spectra of some of the above metals, as well as those of potassium, strontium, barium, &c.

Notes.

FREE SINGING SCHOOLS IN PARIS.—In addition to the twenty-eight schools for adults recently mentioned in the *Journal* as having been established in the municipal schools, and which are held in the evening, there exist singing classes in all the communal schools, whether for boys or girls, which amount to 305, so that there is in all 333 classes for gratuitous instruction in singing maintained by the authorities of the city of Paris.

STORM-CHARTS OF FRANCE.—Charts of the storms which passed over the surface of France during the summer of the present year are being prepared in the meteorological department of the Paris observatory, and will shortly be offered to the public at moderate rates, but the number of copies will be limited by the subscriptions made in advance. The publication is in the hands of the Scientific Association, which has its meetings at the observatory.

ARTESIAN WELLS.—The uncertainty which attaches to the boring for water in the chalk basin has been remarkably illustrated in France. Every visitor to Paris, who takes an interest in such matters, knows the Puits de Grenelle, the water of which is seen at the top of a high monument, and has flown, without interruption and with little variation, for several years. Ten or more years ago another artesian well was commenced by the Avenue St. Cloud, now Avenue d'Eylau, near the Bois de Boulogne, and water was obtained two or three years since, but no practical result has get been achieved, and the boring is still continued. On the other hand, a well was begun only eight months since, at Arcashon, in the Gironde, and at the end of September, when the boring had been carried to the depth of a little more than four hundred feet, the water flowed forth in an abundant and uninterrupted stream, pure and limpid. The diameter of the bore of this last work is twenty-five centimetres, or nearly ten inches English, and the supply is calculated at not less than 500 cubic metres of water per diem. The entire cost of this well is said to have been equal to £720.

Correspondence.

SUBURBAN RAILWAY TRAFFIC.—SIR,—I have read with much interest the letter on suburban railway traffic from Mr. J. R. Smith, which appeared in the *Journal of the Society of Arts* on the 20th ult. The plan for expediting the traffic on these railways, therein brought forward, viz., that of attaching and detaching a carriage at each station from the train while in motion; is one that occurred to me some time ago, but the expense attending the entire reconstruction of the existing rolling stock of the railway companies, which this plan requires, is so great, that it has hitherto prevented me from bringing my plan before the public. However, as Mr. Smith has broached the subject, perhaps you will allow me to explain my views. As Mr. Smith states in his letter, there is no difficulty in detaching a carriage from a train while in motion; this is frequently done at present on some of the principal lines of railway; the real difficulty to be overcome is that of attaching a carriage to the passing train without causing a severe shock to be given to its occupants. To obviate this, Mr. Smith proposes an arrangement of a rope wound round a spring drum, but I confess I do not quite see how this would work, and if it did, it would leave the carriage attached to the train but at a considerable distance behind it. This Mr. Smith foresees, and proposes to haul the carriage up to the train *by manual* labour or by slacking the speed of the engine. Both of these plans I consider faulty; the first would require more power than could be exerted by one man, and the guard of the carriage would be the only person available for the purpose, unless several men were carried especially for that object, which of course would be very objectionable. The second plan, that of slacking the speed of the engine, is more feasible, but would cause loss of time, and there would be a difficulty in winding up the slack of the rope quickly enough to prevent it getting under the wheels. The plan which I propose is this: The carriage to be attached to the train would be placed in a siding parallel with the main line, but at the station this siding should be raised considerably above the level of the main line, and should fall rapidly in the direction of the junction. When the approching train was still some short distance from the station, the carriage would be started down the inclined plane, so that when the train overtook it, it would be travelling at a considerable speed, and the shock occasioned by hooking on would be so slight as not to inconvenience the passengers. Of course the rate at which the train should pass the station should be regulated to a certain maximum speed, at which practice would show this attachment could be effected with ease and safety, and therefore it would be easy to calculate the rate of inclination and length of siding which would be required to give the carriage a rate of speed which would correspond nearly with that of the passing train. The mere attaching the carriage to the train could readily be done. I propose to fix on the end of the last break-van of the train a vertical rod, revolving on a pivot with an overhanging arm, which would catch a hook on the top of the carriage to be attached to the train; on the vertical rod I would have a drum with a friction strap and powerful lever, which would be under the control of the guard; this break would keep the arm of the rod at right angles to the van until the siding began to curve towards the main line, when, by gradually decreasing the pressure on the drum, the arm would be drawn into the same direction as the train. But the real difficulty to be overcome is that of taking hold of the carriage without given it a sudden jerk, and this, I think, is overcome by my plan of the inclined plane. It is quite evident, that if the public is to derive the full benefit from our suburban railways, some means must be devised to accelerate the rate of travelling on them; and I venture to think that some similar plan to the one that has occurred to Mr. Smith and myself will have to be adopted. Hoping that some other members of the Society will favour us with their views on this subject.—I am, &c., CHARLES H. BELOE.

November 1, 1865.

MEETINGS FOR THE ENSUING WEEK.

MON. ...R. Geographical, 8½. 1. Mr. S. W. Baker, "Account of his Discovery of the second great lake of the Nile, Albert Nyanza."

TUES. ...Anthropological, 8.
Zoological, 8½.
Civil Engineers, 8. Sir Charles Tilston Bright, M.P., "The Telegraph to India, and its Extension to Australia and China."
Syro-Egyptian, 7½. Mr. W. F. Ainsworth, "On the Natural Features of Palestine."

WED. ...British Meteorological, 7. 1. Lieut. Rechecheft, I.R.N., "On Extended Series of Meteorological Observations recently adopted in Russia." 2. Mr. John Bloxam, "Temperature at Greenwich and Newport."
Society of Arts, 8. Opening Address by Mr. Wm. Hawes, F.G.S., Chairman of Council.
THURS...Linnæan, 8. Dr. McIntosh. "On British *Salpæ*." 2. Sir John Lubbock, "On *Chloeon*, part 2." 3. Mr. Hailey, "On the *Cynipidæ*." 4. Dr. Baird, "Monograph of the *Aphroditacea*, part 2."

Patents.

From Commissioners of Patents Journal, November 3rd.

GRANTS OF PROVISIONAL PROTECTION.

Animal charcoal, treating—2679—E. Beanes.
Ballast, &c., skips for raising—2663—C. H. Murray.
Barrow—2659—R. Stephens.
Basins, sinks, and baths, overflow for—2637—H. H. Craigie.
Baths—2749—W. Clark.
Billiard tables—2608—W. E. Gedge.
Bits, braces for—2735—J. Orvis.
Blind-cord, weaving the covering of—2681—H. E. Newton.
Boiler tubes, forming the mouths of—2697—G. R. Ghiselin.
Boots, &c.—2133—P. Lawrence.
Buttons—2753—G. A. Huddart.
Caloric or hot air engines—2675—R. A. Brooman.
Cane, splitting and preparing—2717—R. Biessy.
Centrifugal governors—2639—W. E. Newton.
Chemical toys, known as "Pharaoh's serpents"—2694—T. King.
Cocoa-nut, reeds for weaving—2691—T. Catchpole.
Corn, &c., grinding—2583—J. Priestly, W. Whitworth, and J. Sutcliffe.
Cotton, twisting or doubling—2631—J. B. Edge and E. Hird.
Date indicator—2565—L. R. Whitehead.
Electric telegraph conductors—2733—A. Parkes.
Fabrics and tissues, printing and dyeing—2701—W. Clark.
Fibrous substances, machinery used in spinning, &c.—2713—W. Sumner.
Fish hooks—2673—A. Fenton.
Fire-arms, breech-loading—2645—H. H. Williams.
Gas meters—2549—J. Webster.
Gold, &c., crushing and washing—2643—W. H. G. Jones.
Horses, blinkers for—2658—C. A. Elliott.
Hurdles—2629—R. Longdon.
Ice houses, skating places, and baths—2292—A. W. Parker.
Iron in a molten state, applying carbonic gas to—2657—J. C. Ridley.
Iron vessels, preserving and keeping clean the bottoms of—2653—W. J. C. MacMillan, J. Mason, and J. V. Scarborough.
Leather satchels, &c., gussets of—2707—F. Thompson.
Meat for food, preparing—2677—A. H. Hassall.
Meat, mincing—2437—J. Donnell.
Metal, shaping—2552—H. Hughes.
Mortising machines—2731—W. Parsons.
Motive power, obtaining—2425—G. B. McNicol.
Paraffine lamps—2616—D. Gallafest.
Pianofortes, &c.—2683—I. Gregory and E. and W. Farr.
Pianofortes, keys for—2747—D. G. and S. Staight and J. Cheverton.
Plants, dessicating the leaves and flowers of—2703—A. L. McGavin.
Polishing and brushing—2655—J. L. Hancock.
Portfolios, fastening for—2664—J. Orrin and T. Geer.
Postage stamps to letters, apparatus for affixing—2412—H. A. Davis.
Pumps—2745—H. Bateman and E. G. Garrard.
Pumps, double or single action—2622—W. E. Gedge.
Railway switches, points, and signals, working—2669—H. Skinner.
Railway trains, apparatus to facilitate signals being made by passengers in—2755—A. B. Blackburn.
Railway vehicles, axle-box for supplying oil to—2737—W. E. Gedge.
Road carriages and breaks for same—2687—J. Rock.
Roofing, tiles for—2693—J. Taylor.
Ruffles or frills—2579—C. O. Crosby.
Sabots for projectiles—2633—H. H. Williams.
Sewers, trapping and ventilating—2614—R. Abell.
Sewing machine—2532—W. R. Lake.
Sewing machines—2649—G. B. Woodruff.
Sifter—2689—C. H. Cope.
Spring bolts and sleeve links—2665—J., S. A., G. E., & F. F. Reading.
Steam boilers—2661—F. Wise, E. Field, and E. H. Aydon.
Steam boilers, preventing incrustation in—2322—W. Hewitt.
Steam consuming apparatus—2676—F. G. Sicardo.
Steam ships, &c., propelling and steering—2563—R. W. Fraser.
Steel and iron wheel tyres, forging—2695—J. Penton.
Submarine electric telegraph cables—2605—F. T. Hubert.
Table knifes and forks, securing the handles of—2671—T. McGrah.
Textile fabrics, finishing—2647—W. Robertson and J. G. Orchar.
Toothed wheels or pullies, moulding—2751—G. L. Scott.
Vegetable fibres for spinning, preparing—2725—J. H. Dickson.
Windlasses, method of working—2635—G. and A. Deslandes.
Window blinds and screens—2699—J. Ballard.
Window fittings—2603—W. Cooke.
Windows when cleaning, apparatus to be fitted to—2727—J. W. Lea.

PATENTS SEALED.

1270. J. Buchanan.	1315. E. Cordonnier.
1273. J. Casey.	1328. T. Craig.
1274. J. H. Johnson.	1333. H. J. Burt.
1275. R. B. Cooley.	1335. W. Clark.
1277. P. Welch.	1348. H. A. Bonneville.
1283. T. J. Mayall.	1357. R. Leddicoat.
1288. C. S. Baker.	1370. W. R. Williams.
1290. S.L.&A.Fuller & C.Martin.	

From Commissioners of Patents Journal, November 7th.

PATENTS SEALED.

1278. J. C. C. Halkett.	1327. T. Davis.
1284. G. Hartley.	1329. T. Parkinson and W. Snodgrass.
1294. H. W. Hart.	1345. H. Besley.
1297. J. Forbes.	1346. J. Dauglish.
1298. J. Melvin.	1361. G. Walton.
1299. P. Brash and R. Irvine.	1362. A. Chavanne.
1304. J. Goodwin.	1383. T. Marsden.
1305. J. H. Johnson.	1417. T.Calvert&D.Montgomery.
1307. W. Jameson.	1465. H. Tipper.
1309. T. J. Mayall.	1507. W. Clark.
1312. D. Ellis and M. Hillas.	2289. T. Nicholson.
1313. A. Parkes.	2337. W. J. Murphy.
1316. T. Smith and H. James.	

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

2985. J. Shirt.	3111. J. B. Edmonston, J. Carson, and J. Blaylock.
3052. A. Graemiger.	2987. A. C. Dewies.
2971. D. Scattergood.	3013. T.Greenwood& J.Schofield.
2978. J. McKean and T.Greenall.	3006. H. Griffin.
2969. W. Clark.	3075. E. Kirby.
2998. J. Petrie and J. Teal.	
3010. C. O. Heyl.	

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

2429. G. Davies.	2458. J. Fowler, R. Burton, and D. Grieg.
2481. H. N. Penrice.	2505. J. L. Jullion.
2460. E. Fielding.	
2449. N. S. Dodge.	

Registered Designs.

Umbrella-holder—October 31—4750—R. Sill, jun., Birmingham.
The Stem of a Telegraph Insulator—October 31—4751—R. Jobson, Dudley.
The Tout le Monde Billiard Table—November 3—4752—Thos. Turner, Glasscobury Timber Works, Watford, Herts.

LIST OF PRESENTS.

The following Presents have been made to the Society during the past year. The thanks of the Society have been forwarded to the Donors :—

PRESENTS.	DONORS.
Specifications of Patents up to the present time, and Indexes	Commissioners of Patents.
Abridgments of ditto	,,
The Commissioners of Patents' Journal	,,
Catalogue of the Machines, Models, &c., in the Patent Museum, South Kensington	,,
Les Bains Electro-Chimiques. Dr. Caplin	Author.
Picture Cleaning and Restoring, by E. Façon Watson	,,
Journal of the Geological Society of Dublin, Vol. x., part 2, 1863-4	Society.
Statistical Register of South Australia for 1863	W. Walters, Agent General for S. Australia.
Address to Parliament by H.S.H. Prince Alexander di Gonzaga, Duke of Mantua, 1859	Author.
Twenty-four hours under the Commonwealth, by John Scholefield	,,
Report of Experiments on the growth of Wheat for 20 years in succession on the same land, by Messrs. J. B. Lawes and J. H. Gilbert	,,
Transactions of the Institution of Naval Architects, 1864	Institution.
Le Substituant Condenseur a Surface, by M. Emile Martin	Author.
A Letter to Viscount Palmerston on "The Employment of our Labour and Capital at Home," by G. Preston White	,,
The Farm Homesteads of England, by J. Bailey Denton	,,
Inventors' Almanac for 1865	M. Henry.
Memoirs of the Geological Survey of India, Vol. iii., part 2, Vol iv., part 2	Geological Survey of India.
Annual Report of the Geological Survey of India, 1863-4	,,
A general description of Sir John Soane's Museum	The Trustees.
Proceedings of the Royal Society of Edinburgh, Session 1863-4	Society.
Transactions of the Royal Society of Edinburgh, Session 1863-4	,,
Rapport Général sur les traveaux du Conseil d'Hygiène Publique, &c., par M. Adolphe Trebuchet	Author.
Dulau and Co.'s Foreign Catalogue, 1845	Dulau & Co.
Twenty-eighth Annual Report of the Art Union of London, 1864	Art Union.
Transactions of the Institution of Civil Engineers of Ireland, 25th to 28th Session, 1859-63	Institution.
A Treatise on Logic, pure and applied, by S. H. Emmens	Author.
On the Construction and Propulsion of Twin-Screw Vessels, by Capt. T. E. Symonds, R.N.	,,
Sidereal Chromatics, by Admiral W. H. Smyth	,,
Miscellaneous Papers on Scientific Subjects, by T. Seymour Burt, F.R.S., Vol. iii., part 2	Author.
Journals and Reports of Two Voyages to the Glenelg River, and the N. W. coast of Australia, 1863-4	J. Martin.
Reports on the Formation of the Canterbury Plains, by Julius Haast, Ph. D.	,,
Report on the Geological Survey of the Province of Canterbury, by Julius Haast, Ph. D.	,,
Transactions of the New York State Agricultural Society, 1863	Society.
Hunt on Stammering (6th edition)	Messrs. Longman and Co.
Catalogue of the Loan Collection of Miniatures at the South Kensington Museum	Department of Science and Art.
Institution of Civil Engineers, Minutes of Proceedings, Vol. xxi.	Institution.
———, general index of, Vols. i.—xx	,,
Proceedings of the Literary and Philosophical Society of Liverpool, 1863-4, Vol. xviii.	Society.
Catalogue of the Coachmakers' Industrial Exhibition, 1865	G. A. Thrupp.
The food of man in relation to his useful work, by Dr. Playfair	Author.
Transactions of the Society of Engineers, from commencement to 1864	Society.
Mathematical Physics (2 vols.), by John Herapath	Author.
Tractatus de legibus et consuetudinibus regni Anglie, tempore Regis Henrici Secundi, &c.	G. R. Burnell.
Exposition Universelle de 1855 Beaux Arts	,,
Explication des Ouvrages de Peinture, Sculpture, &c., exposes au Palais des Champs Elysées, Mai, 1861	,,
Guide Pratique du Constructeur d'Appareils Economiques de Chauffage, par P. Flamm	,,
De l'Influence de l'Industrie sur les Beaux-Arts, par E. Van den Boorn	,,
Revue Archæologique de l'Exposition des Beaux-Arts de Rouen	,,
La Reforme de l'Ecole des Beaux-Arts	,,
Réorganisation de l'Ecole des Beaux-Arts	,,
Intervention de l'etat dans l'enseignement des Beaux-Arts	,,
Des Concours pour les Monuments Publics dans le passé, le present, et l'avenir, par M. Daly	,,
Du traitment Industriel des plantes filamenteuses qui peuvent être employées a la fabrication des tissus et du papier, par J. Masse	,,
Note sur les Bétons Agglomérés Système Coignet	,,

PRESENTS.	DONORS.
Application de la Telégraphie Electrique aux usages Domestiques	G. R. Burnell.
Exposition Universelle de 1862, Catalogue Officiel, Section Francaise	,,
Considerations sur la question posée au Congrès Artistique d'Anvers...	,,
The Gas Engineers' Book of Reference	,,
Catalogue of the Library of the Institution of Civil Engineers.....	,,
Catalogue of Natural and Industrial Products of Queensland at the International Exhibition, 1862	,,
Descriptive and Historical Catalogue of the Pictures in the National Gallery, by R. N. Wornum.....	,,
Catalogue of the Agricultural Show in Battersea Park, 1862	,,
An account of the stopping of Daggenham Breach, &c., by Capt. J. Perry	,,
Annuario del Reale Instituto Lombardo di Scienze e Lettere, 1864...	,,
Romanum plantanum fasciculus Alter, Accedit enumeratio plantarum sponte nascentium in Ruderibus Amphiteatri Flavii auctore Antonio Sebastiani.....	,,
Navigation improved, a Treatise on the defects of Middle Latitude and Mercator Sailing, by B. Workman	,,
Reports of the Inspectors of Factories for the half-year ending 30th April, 1865.....	A. Redgrave.
Transactions of the American Institute, 1862 and 1863.....	Institute.
Proceedings of the American Philosophical Society, Vol. ix., No.'s 71 and 72	Society.
Catalogue of Library of the American Philosophical Society, part 1...	,,
Transactions of the American Philosophical Society, Vol. xiii. part 1...	,,
Smithsonian Report, 1863	Smithsonian Inst.
——— Contributions to Knowledge, Vol. xiv.	,,
Smithsonian Meteorological Observations, 1854-59, Vol. ii., part 1.....	Smithsonian Inst.
The Elements of Picturesque Scenery, by Henry Twining	Author.
Statistics of the Foreign & Domestic Commerce of the United States, 1864	U. S. Treasury.
Twentieth Annual Report of the Board of Trustees of the Public Schools of the City of Washington	Trustees.
Archæologia, or Miscellaneous tracts relating to Antiquity, Vol. xxxix., part 1....	Society of Antiquaries.
Proceedings of the Society of Antiquaries, Vol. ii., No. 6.....	,,
Atti della Academia di Scienze e lettere di Palermo, Vol. 2.	Count Lancia di Brolo.
Report of the British Association for the advancement of Science, Bath, 1864	Association.
Index to the Reports and Transactions of the British Association for the advancement of Science from 1831-60	,,
Principles and Practice of Medical Jurisprudence, by Dr. Taylor, F.R.S.	Author.
United States Patent Office Report, 1862	Commissioners of Patents, U. S.
Inorganic Chemistry for Science Classes, by Fearnside Hudson, F.C.S.	Author.
Life of the Marquis of Worcester, by Henry Dircks.....	,,
Proceedings of the Linnæan Society.	Society.
——— Royal Society ...	,,
——— Royal Agricultural Society.....	,,
——— Society of Antiquaries	,,
Transactions of the Institute of British Architects.....	Institute.
American Journal of Science and Art.....	Messrs. Siliman & Dana.
Dictionary of Chemistry, by Henry Watts, B.A. (in continuation).....	Author.
Proceedings of the Royal Geographical Society	Society.

CONTRIBUTIONS TO THE READING ROOM.

The Council beg to acknowledge, with thanks to the Proprietors, the regular receipt of the following Journals and Periodicals:—

WEEKLY.

Agricultural Review.
Athenæum.
British Journal of Photography.
Builder.
Building News.
Chemical News.
Cosmos.
Engineer.
Gardeners' Chronicle.
Herapath's Railway and Commercial Journal.
Les Mondes.
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Mining Journal.
North British Agriculturist.
Photographic News.
Reader.
Social Science Review.

FORTNIGHTLY.

Canadian News.
Cotton Supply Reporter.

MONTHLY.

Artizan.
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Civil Engineer and Architects' Journal.
Educational Times.
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Journal of the Board of Arts and Manufactures for Upper Canada.
Journal of the Franklin Institute.
Journal of the Horticultural Society.
Journal of the National Life Boat Institution.
Journal of the Pharmaceutical Society.
London, Edinburgh, and Dublin Philosophical Magazine and Journal of Science.
Newton's London Journal of the Arts and Sciences.
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Practical Mechanics' Journal.
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Revue du Monde Colonial.
The Horological Journal.
The Institute and Lecturers' Gazette.
Working Men's Club and Institute Union Magazine.

QUARTERLY.

Fine Arts Review.
Journal of Mental Science.
Journal of the Geological Society.
Journal of Microscopical Science.
Journal of the Royal Dublin Society.
Journal of the Royal United Service Institution.
Journal of Science.
Journal of the Statistical Society.
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